

9

NAV 8224
PATENT**REMARKS**

Applicants have thoroughly considered the Examiner's remarks and the application has been amended in light thereof. Claims 56-73 are presented for further examination. Claims 56, 58, 60-62, and 64 have been amended by this Amendment C and claims 68-73 have been added. Reconsideration of the application claims in view of the amendments and the following remarks is respectfully requested.

Nonstatutory Double Patenting

Claims 56-67 stand rejected under the judicially created doctrine of nonstatutory obviousness-type double patenting rejections in view of two related issued patents in view of Cosman '126. However, the nonstatutory double patenting rejections with regard to U.S. Patent No. 6,434,415, claims 1-25, and U.S. Patent No. 6,347,240, claims 1-55, in view of Cosman '126 are inappropriate as claims 56-67 recite aspects that are patentably distinct and not obvious variations of the claims of '415 and '240 in view of Cosman '126.

As previously noted, '415, and '240 are each based on and claim priority to U.S. Patent Application 07/600,753 filed on October 19, 1990. In contrast, the present application claims priority to a continuation-in-part U.S. Patent Application No. 08/319,615, which was filed on October 7, 1994, now abandoned.

The Examiner in her remarks in the Advisory Action mailed 1/26/04 "re-states that the priority dates have nothing to do with double patenting rejections." Applicants respectfully submit that the Examiner is missing the point. The present patent application *includes and claims additional subject matter not in 08/319,615 and does not claim priority to the 1990 patent application.* The 1990 application does not even have the word "transform" in it. Thus, a double patenting rejection is not appropriate.

Applicants note that each of the independent method claims (e.g., 56, 58, 62) has been amended to recite:

deriving a transform ... said transform indicative of a difference between the relative position of each of the reference points for the semi-rigid body element during the procedure and the relative position of the reference points in the image data set;

Also, each of the independent system claims (e.g., 60, 61, 64) has been amended to recite:

E

10

NAV 8224
PATENT

said processor transforming the image data set indicative of a difference between the relative position of each of the reference points for the semi-rigid body element during the procedure and the relative position of the reference points in the image data set;

In the remarks to the Advisory Action mailed 1/26/04, the Examiner "re-directs Applicant to col. 11, lines 51-67, stating "one may make computer graphic manipulations to register correspondence of the image points ... and other power graphic standards as well as mathematical algorithm...." Applicants fail to see how this vague suggestion recognizes "a difference between the relative position of each of the reference points," as recited by each of the claims. Furthermore, the Examiner has left out a key aspect of the text. Cosman specifically states at lines 56-58 "Registering these two sets of the same physical points in the computer graphics would be an (sic) tractable way of registering the entire two perspective views."

Thus, the teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, relate to **registration** of an image to a reference and do not suggest deriving a transform indicative of a difference between the relative position of each of the reference points or a processor transforming the image data set indicative of a difference between the relative position of each of the reference points. A close reading of Cosman '126 reveals that Cosman does not anticipate that the image data set needs to be transformed with respect to differences in the relative position of the reference points. Instead, Cosman teaches scaling, rotating and translating for the purpose of registration of an image to a reference—which is not transforming as defined by the claims. For example, Cosman never mentions or recognizes "a difference between the relative position of each of the reference points," as recited by each of the claims. Cosman assumes to the contrary that the relative position of each of the reference points will not change. Since Cosman is silent on the need for a transform and is silent on the purpose of the transform, Applicants are unable to understand the basis for the Examiner's rejection.

The Examiner generally indicated that claims 56-67 were obvious in view of the claims of '415, and '240 in view of Cosman '126 but does not address each and every aspect of each and every claim as required to support an obvious-type double patenting. Furthermore, the Examiner fails to indicate how the teachings of Cosman '126 as applied

10

11

NAV 8224
PATENT

to the claims of '415 and '240 would result in claims 56-67 being obvious. For these reasons alone the rejection must be withdrawn. In any case, in order to support the inappropriateness of these rejections and particularly in view of the above, the rejection should be withdrawn.

In addition, Applicants will briefly address examples of aspects of 56-67 claims that are patentably distinct from and not obvious variations of the claims of '415, and '240 in combination with Cosman '126. For example, Applicants note that claims 56-67 distinguish over Cosman '126 for at least the following reasons. For example, claims 56, 58 and 62 recite deriving a transform and modifying the image based on the transform. The limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such recitals obvious. As another example, claim 60 recites modifying the image data set based on the identified position of the reference points. As another example, claim 61 recites modifying the image data set based on the identified position of the contour of the body element. As another example, claim 64 recites modifying the image data set according to a comparison of projections. The limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such recitals obvious.

Thus, claims 56-67 distinguish over Cosman '126. In addition, claims 56-67 distinguish over the claims of '415 and '240 as evidenced by the Examiner's withdrawal the previous double patenting rejection based only on the claims of '415 and '240. In summary, it has been shown that claims 56-67 distinguish over both Cosman '126 and the claims of '415 and '240 so the double patenting rejection must be withdrawn.

In the remarks to the Advisory Action mailed 1/26/04, the Examiner also cites "US patent 5,792,147 which clearly shows that the skin moves and thereby the markers glued on it move based on the skin movement thereby introducing errors." However, the combination of Cosman and '147 falls short because neither reference recognizes "a difference between the relative position of each of the reference points" and fails to suggest a transform to address this. Applicants respectfully submit that the Examiner is using hindsight analysis, that there is no basis for combining the references as suggested by the Examiner and that even combined the references fall short.

E

12

NAV 8224
PATENT

The Examiner also asserts without basis that "claims 56-67 merely constitute alternate obvious variations of the patented claims" However, the Examiner has withdrawn the double patenting rejection of claims 56-67 based on the claims of '415 and '240 confirming that claims 56-67 are patentable over the claims of '415 and '240 considered alone. Furthermore, there is no basis for this assertion based on Cosman '126 considered alone or in combination with the claims of '415 and '240 since neither addresses "a relative position between said reference points of the semi-rigid body elements being variable" as recited by each of the independent claims (i.e., see claims 56, 58, 60, 61, 62 and 64.). Applicants request that the Examiner cite a specific portion of Cosman '126 or a specific portion of the claims of '415 and '240 or another reference to support this "alternate, obvious variations" assertion or withdraw the rejection. As noted above, the limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such the recitals of claims 56-67 obvious.

The Examiner also asserts without basis that "the localization of the semi-rigid body element...would have been an obvious modificationin that, if the reference points were placed on the skin as taught by Cosman '126, then the relative position of the reference points would change." However, Cosman '126 does not address this aspect of the invention and appears to assume that the relative position of the reference points does not change. Applicants request that the Examiner cite a specific portion of Cosman '126 to support this "obvious" assertion or withdraw the rejection.

In particular, amended claims 56, 58, 60, 61, 62, and 64 recite that "a relative position between the reference points of a semi-rigid body element being variable." In general, claims 56-67 identify the relative position of the reference points for the semi-rigid element, relate the relative position of the reference points during the procedure to the relative position of the reference points in the image data set, and modify the image data set based on the relative position of the variable reference points during the procedure to the relative position of the reference points in the image data set. These aspects of the claims go far beyond the general teachings of Cosman '126 and is not recited by the claims of '415, and '240. As such, claims 56-67 are patentably distinct from the claims of '415, and '240 in view of Cosman '126. As noted above, the limited

E

13

NAV 8224
PATENT

teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such the recitals of claims 56-67 obvious.

With regard to '415, claims 56-67 recite different aspects than claims 1-25 of '415 in view of Cosman '126. For instance, the current claims recite determining and displaying the geometry of a semi-rigid body element which is different than determining and displaying the relative positions of a plurality of body elements as recited by the claims of '415 and as noted by Cosman '126. The current claims recite a semi-rigid body element wherein a relative position between the reference points of the body element is variable. This is different than Cosman '126 and the claims of '415 that generally recite that the reference points for each particular body element has a known or fixed position relative to the data points of the particular body element. Also, the current claims recite identifying the relative position of each reference point on a body element which is different than identifying or determining the position of the reference points of each body element relative to the reference points of the other body elements as recited by the claims of '415 and as noted by Cosman '126. Further, the present claims recite modifying the image data set representing a semi-rigid body element based on the relative position of the reference points of the body element intra-procedurally and pre-procedurally. This is different than the claims of '415 and Cosman '126 that recite modifying the spatial relationship of the data points of one body element relative to the data points of another body element. Once again, the limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such the recitals of claims 56-67 obvious.

With regard to '240, claims 56-67 recite different aspects than claims 1-55 of '240 in view of Cosman '126. The current claims recite the relative position of reference points of a semi-rigid body element. This is different than Cosman '126 and the claims of '240 that recite representing, modifying, and illustrating the relative position of two or more body elements relative to each other. Once again, the limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such the recitals of claims 56-67 obvious.

Additionally, the current claims recite the relative position between two or more reference points of a semi-rigid body element is variable. This is different than the

E

14

NAV 8224
PATENT

claims of '240 and Cosman '126 that generally recite reference points of a particular body element that have a known spatial relation to the data points of the particular body element. The current claims also recite modifying the image data set based on relating the relative position of the reference points of a body element during a procedure to the position of the same reference points for the same body element prior to the procedure. This is different than Cosman '126 and the claims of '240 which generally recite modifying the spatial relationship of the data points of one body element relative to the data points of another body element. Finally, claims 56-67 recite determining and illustrating the geometry of a body element which is different than the claims of '240 and Cosman '126 that recite determining and illustrating the position of one body element relative to another body element. Once again, the limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such the recitals of claims 56-67 obvious.

As has been shown, claims 56-67 are patentably distinct from and not obvious in view of the claims 1-25 of the '415 patent and claims 1-55 of the '240 patent. Applicants request that the Examiner withdraw the obviousness-type double patenting rejections based on '415 and '240 in view of Cosman '126.

Claim Rejections – 35 USC § 103

Claims 56-67 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cosman '126. This rejection is improper and must be withdrawn for the following reasons.

Before reiterating the five (5) reasons which establish the patentability of the claims, Applicants again note that each of the independent method claims (e.g., 56, 58, 62) has been amended to recite:

deriving a transform ... said transform indicative of a difference between the relative position of each of the reference points for the semi-rigid body element during the procedure and the relative position of the reference points in the image data set;

Also, each of the independent system claims (e.g., 60, 61, 64) has been amended to recite:

15

NAV 8224
PATENT

said processor transforming the image data set indicative of a difference between the relative position of each of the reference points for the semi-rigid body element during the procedure and the relative position of the reference points in the image data set;

As noted above, the teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, relate to registration of an image to a reference and do not suggest deriving a transform indicative of a difference between the relative position of each of the reference points or a processor transforming the image data set indicative of a difference between the relative position of each of the reference points. Since Cosman is silent on the need for transformation with respect to differences in the relative position of the reference points and is silent on the purpose of the transform, Applicants are unable to understand the basis for the Examiner's rejection.

In the remarks to the Advisory Action mailed 1/26/04, the Examiner also cites "US patent 5,792,147 which clearly shows that the skin moves and thereby the markers glued on it move based on the skin movement thereby introducing errors." As noted above, the combination of Cosman and '147 falls short because neither reference recognizes "a difference between the relative position of each of the reference points" and fails to suggest a transform to address this. Applicants respectfully submit that the Examiner is using hindsight analysis, that there is no basis for combining the references as suggested by the Examiner and that even combined the references fall short.

Applicants request the Examiner point out a teaching in either reference that would suggest that the scaling, rotating and translating mentioned ever so briefly in Cosman would be effected by "a difference between the relative position of each of the reference points," as recited by the claims. Further, Applicants request the Examiner point out a teaching in either reference that would suggest that the scaling, rotating and translating requires a transform to compensate for "a difference between the relative position of each of the reference points," as recited by the claims.

Furthermore, Applicants reiterate the **FIVE (5)** reasons previously presented which establish the patentability of the claims over Cosman '126.

E

16

NAV 8224
PATENT

First, as noted above, Cosman '126 does not read on the claims. The limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make the recitals of claims 56-67 obvious.

Second, the Examiner asserts without basis that the "relative positions of the reference points will necessarily change...." There is no basis for this assertion based on Cosman '126 considered alone. As noted above, the combination of Cosman and '147 falls short because neither reference recognizes "a difference between the relative position of each of the reference points" Rather, this is hindsight analysis. Applicants request that the Examiner cite a specific portion of Cosman '126 or another reference to support this assertion or withdraw the rejection.

Third, the Examiner asserts without basis that the "use of fluoroscopic imaging in order to align these images ... would have been an alternative functional equivalent...." Applicants do not understand the point of this assertion since claims 56-67 do not claim fluoroscopic imaging to align images. In any case, Applicants do not see the basis for this assertion in Cosman '126 considered alone. Applicants request that the Examiner cite a specific portion of Cosman '126 or another reference to support this assertion or withdraw the rejection.

Fourth, the Examiner asserts without basis that "One skilled in the art would have known that any type of imaging can be used to localize the reference points and align them with previously taken images by the modality of interest." Applicants do not understand the point of this assertion since claims 56-67 are directed to a semi-rigid body element having variable, relative reference points. In any case, there is no basis for this assertion based on Cosman '126 considered alone. Applicants request that the Examiner cite a specific portion of Cosman '126 or another reference to support this assertion or withdraw the rejection.

Fifth, claims 56-67 distinguish over Cosman '126 for the reasons noted above. For example, claims 56, 58 and 62 recite deriving a transform and modifying the image based on the transform. The limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such recitals obvious. As another example, claim 60 recites modifying the image data set based on the identified position of the reference points. As another example,

8

17

NAV 8224
PATENT

claim 61 recites modifying the image data set based on the identified position of the contour of the body element. As another example, claim 64 recites modifying the image data set according to a comparison of projections. The limited teachings in Cosman '126 relating to scaling, rotating and translating noted in column 11 and 13-19, cited by the Examiner, do not make such recitals obvious.

Thus, the rejection under 35 USC § 103 based on Cosman '126 should be withdrawn.

In addition, new claims 68-73 have been added. Claims 68-70 depend respectively from each of the three independent method claims are recite:

wherein deriving comprises deriving a transformation which allows the determination of the procedural position, orientation, and shape in surgical space of the semi-rigid body element, and wherein modifying comprises modifying the image data set according to said transformation to produce a displaced image data set reflecting changes in the geometry of the semi-rigid body elements during the procedure.

Claims 71-73 depend respectively from each of the three independent system claims and recite:

wherein the processor derives a transformation which allows the determination of the procedural position, orientation, and shape in surgical space of the semi-rigid body element, and wherein the processor modifies the image data set according to said transformation to produce a displaced image data set reflecting changes in the geometry of the semi-rigid body elements during the procedure.

None of the cited references address the determination of the procedural position, orientation, and shape in surgical space of the semi-rigid body element such that the image data set is modified to produce a displaced image data set reflecting changes in the geometry of the semi-rigid body elements during the procedure. Thus, Applicants respectfully request that new claims 68-73 be allowed.

E

18

NAV 8224
PATENT**CONCLUSION**

It is believed that a full and complete response has been made to the Office action and, as such, places the application in condition for allowance. Such allowance is hereby respectfully requested. The fact that Applicants may not have specifically traversed any particular assertion by the Office should not be construed as indicating Applicants' agreement therewith. If the Examiner feels that a personal interview will expedite the prosecution of this application, the Examiner is invited to telephone the undersigned.

It is believed that there are no fees associated with this Amendment C. If the Commissioner determines there are fees due, the Commissioner is hereby authorized to charge any required government fees to Deposit Account No. 19-1345.

Respectfully submitted,



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